

REMARKS

In the Office Action mailed January 13, 2005, Claim 12 is currently objected to for various alleged informalities. Claims 7-11 and 13-15 stand rejected under 35 USC § 102(e) as allegedly being anticipated by Marash et al. (U.S. Patent No. 6,049,607). In addition, Claim 12 stands rejected under 35 USC § 102(b) as being allegedly anticipated by Betts et al. (U.S. Patent No. 5,828,657). Finally, Claims 1-6 and 16 stand rejected under 35 USC § 103(a) as being allegedly unpatentable over Marash et al. (U.S. Patent No. 6,049,607) in view of Betts et al. (U.S. Patent No. 5,828,657).

After a careful review of the currently pending claims, Applicants respectfully request reconsideration of the pending rejections in view of the following remarks and clarifications.

I. CLAIM OBJECTIONS

Claim 12 stands objected to because of various alleged informalities. Corrections have been made to overcome these formalities.

II. CLAIM REJECTIONS UNDER 35 U.S.C. § 102(e)

Claims 7-11 and 13-15 stand rejected under 35 USC § 102(e) as being allegedly anticipated by Marash et al. (U.S. Patent No. 6,049,607). And Claim 12 stands rejected under 35 USC § 102(b) as being allegedly anticipated by Betts et al. (U.S. Patent No. 5,828,657).

Applicants respectively traverse.

A. Applicants' Presently Claimed Invention

Applicants' presently claimed invention generally relates to echo cancellers that distinguish speech signals from other types of communication signals and echo cancellers that are enabled based upon the type of communication signal received from an outside source. (Applicants' Specification p. 2, lines 3 – 6).

As Applicants describe, in telecommunication networks, a subscriber device is connected to other subscriber devices using various connection techniques. For example, over short distances, two-wire lines may be employed. For longer distances, four-wire lines may be used. In addition, hybrid circuits are used to connect two-wire lines to four-wire lines.

5 Voice messages are transmitted through the network. For instance, if the subscriber device is a telephone, a voice message may be transmitted from a telephone, over a two-wire line to a first hybrid circuit, and then over a four-wire line to a second hybrid circuit. The second hybrid circuit may be connected to a second subscriber device.

In addition to voice messages, telecommunication networks also transmit data signals.
10 Many of the data signals are narrow-band. For example, narrow-band data signals generated by V.21 modems are transmitted over telecommunication networks. Although some data signals can not be classified as narrow-band signals, these signals are modulated, and, therefore, their energy centers around a carrier frequency. (Applicants' Specification p. 2, lines 9 – 21).

The currently pending claims are generally directed to an echo canceller disabler for
15 modulated data signals. Indeed, this is the title of Applicants' present invention. The system and method determine whether far and near-end signals are predetermined types of signals, such as modulated signals used to transmit data. The invention then ascertains further information concerning the near and far-end signals and determines whether to freeze the adaptation of the echo canceller or bypass the echo canceller based upon this information. (Applicants'
20 Specification p. 2, lines 3 – 6).

Applicants describe the operation of such a system in Figure 2. As illustrated in Figure 2, at step 202, the system determines the nature of the near and far-end signals. In other words, the system determines whether the signals (far-end and near-end) are of a certain type, such as,

modulated data signals. At step 204, the system uses the results at step 202 to make a branching decision. For example, if data was detected at step 202, then control proceeds to step 206. If data was detected, that is, at least one of the signals represents a data signal, then at step 206, the system determines whether the adaptive filter converges. Step 206 may have already been
5 determined earlier. For example, a training signal is supplied before data signal transmission and the adaptive filter converges to the true echo path by the training. If the answer at step 206 is affirmative, then control continues at step 210 where adaptation is frozen. If the answer is negative, control continues at step 212 where the echo canceller is disabled. (Applicants' Specification at p. 19 lines 11 – 21).

10 The presently pending Independent Claims 1, 6, 7, 12, and 13 are directed to such a method and system. For example, Independent Claim 1 expressly recites the steps of “determining whether said far-end signal is representative of a modulated signal,” “determining whether said near-end signal is representative of a modulated signal,” and “controlling the operation of said echo canceller in response to . . . said steps of determining whether said far-end
15 and near-end signals are modulated signals.”

The remaining Independent Claims 6, 7, 12, 13 recite similar limitations. For example, Independent Claim 6 expressly recites “determining whether said far-end signal is representative of a modulated signal,” “determining whether said near-end signal is representative of a modulated signal,” “controlling the operation of said echo canceller in response to . . . said steps
20 of determining whether said far-end and near-end signals are data.” Independent Claim 7 expressly recites a “determination means . . . for determining characteristics of said near-end and far-end signals, and a “control means . . . [that] adjusts the operation of said adaptive filter based upon said characteristics of said near and far-end signals.”

Independent Claim 12 expressly recites a “determination means . . . for determining whether said near-end and far-end signals are not speech signals,” and a “control means . . . [that] adjusts the operation of said adaptive filter based upon the characteristics of said near and far end signals.” And Independent Claim 13 recites a “means for determining whether said near and far end signals have predetermined characteristics,” and a “means for sending a control signal to control the operation of an echo canceller based upon said determination of whether said near and far end signals have predetermined characteristics and said operating characteristics.”

B. Neither Marash ‘607 Nor Betts ‘657 Teach or Suggest Determining Whether A Near-End Or Far-End Signal Is A Modulated Signal

Applicants respectively submit that neither Marash ‘607 nor Betts’ 657 disclose the steps of “determining whether said far-end signal is representative of a modulated signal” or “determining whether said near-end signal is representative of a modulated signal” as expressly recited in Independent Claim 1. Naturally, therefore, these references also fail to disclose the step of “controlling the operation of said echo canceller in response to . . . said steps of determining whether said far-end and near-end signals are modulated signals.”

Rather, Marash ‘607 appears generally directed to echo-cancellation in full-duplex teleconferencing systems. Marash ‘607 describes a preferred situation where the echo-canceling system updates a transfer function continuously in real time. (Marash ‘607 Col. 2, lines 11-14).

To achieve this, Marash ‘607 relies upon an adaptation process by which the echo-canceling system is updated in real time may be an LMS (least means square) adaptive filter with the far-end signal used as the reference signal. Marash ‘607 further describes that the LMS filter estimates the interference elements (echoes) present in the interfered channel by multiplying the reference channel by a filter and subtracting the estimated elements from the interfered signal.

The resulting output is used for updating the filter coefficients. The adaptation process will

converge when the resulting output energy is at a minimum, leaving an echo free signal. (Marash '607 Col. 2, lines 14-25).

However, as Applicant's specifically point out in their Application, LMS has certain inherent problems that Applicants have solved. For example, Applicants note that one
5 consequence of using hybrid circuits to couple different types of connections together is the creation of echoes. That is, speech may be reflected by a hybrid circuit back to the speaker, causing the speaker to hear their own voice. Echo cancellers are used to minimize or eliminate the effects of these echoes. (Applicant's Specification at p. 3. lines 1-4).

Echo cancellers may use adaptive filters. An adaptive filter, using a filtering algorithm,
10 produces a mathematical model of echo characteristics, which is used to generate an echo estimate. For example, if a first subscriber device sends a signal to a second subscriber device, an echo may be created. A return signal is formed, which comprises a signal sent from the second device together with the echo. When echo cancellation is performed, the echo canceller subtracts the echo estimate (created by the adaptive filter) from the return signal. Thus, the
15 signal received by the first device should be echo-free or substantially echo-free. (Applicant's Specification at p. 3. lines 5-11).

However, Applicants note that the filtering algorithms used in adaptive filters as referenced in Marash '607 have inherent limitations. For example, an adaptive filter, which uses the least mean square (LMS) algorithm in the adaptive filter, may diverge for narrow-band data
20 signals. Specifically, although the echo may be cancelled, the adaptive filter will not converge the true echo path. In fact, the echo canceller will diverge to a filter related to the narrow-band frequency. (Applicant's Specification at p. 3. lines 12-16). Marash '607 only teaches the use of

LMS algorithms, Marash '607 does not teach or suggest determining whether a far-end signal is a modulated signal.

The Office Action relies on various portions of the Marash '607 reference as disclosing Applicants' steps of determining whether the near end and far-end signal is representative of a modulated signal and then controlling the operation of the echo canceller in response to determining whether the far-end and near-end signals are modulated signals. (January 13, 2005 Office Action at p. 3). However, the cited portions of Marash '607 merely appear to reiterate that Marash '607 utilizes LMS.

For example, the Office Action relies in part on Marash '607 Col. 5, line 63-65 and Col. 6 lines 1-8 as teaching Applicants' determination step. But this cited portion of Marash '607 appears to merely discuss utilizing LMS filters for echo suppression. For example, at Col. 6 lines 1-6, Marash '607 states "While Normalized LMS filters are preferred, those skilled in the art will readily understand that other type of adaptive filters are applicable to the present invention." There is simply no teaching or suggestion here as to determining whether a far-end signal is a modulated signal.

To anticipate a claim, "each and every element set forth in the claim [must be] found, either expressly or inherently described, in a single . . . reference." *Vergall Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (M.P.E.P. Section 2131). Consequently, since Marash '607 does not teach or suggest "determination means, coupled to said near and far-end signals, for determining characteristics of said near-end and far-end signals" Marash '607 simply also does not teach or suggest a control means that "adjusts the operation of said adaptive filter based upon said characteristics of said near and far-end signals." Marash '607 therefore does not to teach every element of the claimed invention and, therefore does not anticipate

Independent Claims 7, 12, or 13.

Claim 12 stands rejected under 35 USC § 102(b) as being anticipated by Betts et al. (U.S. Patent No. 5,828,657. Applicants respectively traverse.

As Applicants noted above, presently pending Independent Claim 12 expressly recites a
5 “determination means . . . for determining whether said near-end and far-end signals are not speech signals,” and a “control means . . . [that] adjusts the operation of said adaptive filter based upon the characteristics of said near and far end signals.”

Applicants respectively submit that Betts’ 657 does not disclose a “determination means . . . for determining whether said near-end and far-end signals are not speech signals,” or a
10 “control means . . . [that] adjusts the operation of said adaptive filter based upon the characteristics of said near and far end signals.” Naturally, therefore, Marash ‘607 also fails to disclose the step of “controlling the operation of said echo canceller in response to . . . said steps of determining whether said far-end and near-end signals are modulated signals.”

Rather, Betts ‘657 appears generally directed to echo-canceling modems. Betts ‘657 does
15 not appear to specify or disclose a preferred method of echo cancellation, let alone a method of determining whether a near-end or far-end signal is not a speech signal. For example, the cited portion of Betts ‘657 merely describes that during half-duplex training, “each modem uses the returned far-end echo signal to adjust the tap coefficients for its echo canceller.” (Betts ‘657 Col. 3, lines 56-58). There is simply no teaching or suggestion here as to determining whether a far-
20 end signal is a modulated signal.

To anticipate a claim, “each and every element set forth in the claim [must be] found, either expressly or inherently described, in a single . . . reference.” *Vergall Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (M.P.E.P. Section 2131). Consequently,

since Betts '657 does not teach or suggest "determination means, coupled to said near and far-end signals, for determining characteristics of said near-end and far-end signals" Betts '657 simply also does not teach or suggest a control means that "adjusts the operation of said adaptive filter based upon said characteristics of said near and far-end signals." Betts '657 therefore does not to teach every element of the claimed invention and, therefore does not anticipate Independent Claim 12.

II. CLAIM REJECTIONS UNDER 35 U.S.C. § 103(a)

Claims 1-6 and 16 stand rejected under 35 USC § 103(a) as being unpatentable over Marash et al. (U.S. Patent No. 6,049,607) in view of Betts et al. (U.S. Patent No. 5,828,657).

However, as discussed in detail above, neither Marash '607 and Betts' 657 teach or suggest the steps of "determining whether said far-end signal is representative of a modulated signal" or "determining whether said near-end signal is representative of a modulated signal" as expressly recited in Independent Claim 1 and similar limitations expressly recited in Independent Claims 6, 7, 12, and 13.

Consequently, Independent Claims 1, 6, 7, 12, and 13 are allowable for at least all of the reasons stated above. The remaining claims 2-5, 8-11, and 14 - 16, are all dependent on these allowable independent claims and are therefore allowable for at least the reasons states above.

IV. SUMMARY

In view of the remarks above, Applicants' respectfully submit that the present application is in condition for allowance and solicits action to that end. If there are any additional matters that may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact Applicant's undersigned representative.

Respectfully submitted,

McDonnell Boehnen Hulbert & Berghoff LLP

10 Date: March 16, 2005

By: _____



Thomas E. Wettermann

Reg. No. 41,523